that the atypical Beijing genotype (attenuated phenotype) can become virulent and spread in patients infected with HIV despite the acquisition of resistance markers which have a fitness cost.

Conclusion: Our results raise concern for the spread of all drug-resistant strains in vulnerable populations. Greater vigilance is required to contain the drug-resistant TB epidemic in high HIV prevalence settings. This can be achieved by the development and implementation of rapid diagnostics, ensuring treatment adherence and intensified screening of contacts. However, in order for diagnosis and treatment to be effective it is essential that communities are educated to improve health seeking behavior.

doi:10.1016/j.ijid.2008.05.006

7.003

The Emergence of Nipah Virus in Malaysia: The Role of Pteropus Bats as Hosts and Agricultural Expansion as a Key Factor for Zoonotic Spillover

J.H. Epstein[1,*], S.A. Rahman[2], J.R.C. Pulliam[3], S.S. Hassan[2], K. Halpin[4], C.S. Smith[5], A.A. Jamaluddin[6], K.B. Chua[7], H.E. Field[5], A. Hyatt[4], S.K. Lam[8], A. Dobson[9], P. Daszak[1], HERG (The Henipavirus Ecology Research Group)

[1] *The Consortium for Conservation Medicine, New York, NY, USA*
[2] *Veterinary Research Institute, Ipoh, Malaysia*
[3] *Emory University, Atlanta, GA, USA*
[4] *Australian Animal Health Laboratory, Geelong, Australia*
[5] *Animal Biosecurity, Department of Primary Industries and Fisheries, Brisbane, Australia*
[6] *Department of Veterinary Services, Kuala Lumpur, Malaysia*
[7] *Ministry of Health, Kuala Lumpur, Malaysia*
[8] *University of Malaya, Kuala Lumpur, Malaysia*
[9] *Princeton University, Princeton, NJ, USA*

Nipah virus (NiV) emerged in Malaysia in 1998 as a respiratory and neurologic disease in pigs and caused a severe febrile encephalitis in humans, carrying a 40% mortality rate ($n = 265$). Bats of the genus Pteropus are considered a natural reservoir for Nipah virus and other related henipaviruses. We proposed two hypotheses for NiV emergence: 1) Nipah virus is endemic and circulating in pteropid bats throughout Malaysia and these bats normally occurred in the area of the index farm where Nipah virus emerged; and 2) the intensification of pig farms in Malaysia enabled sustained NiV epidemics to occur in pigs, facilitating NiV emergence in humans. We performed cross-sectional serological surveys of *Pteropus vampyrus* and *P. hypomelanus* from spatially disparate colonies across Peninsular Malaysia. A longitudinal sero-survey of *P. hypomelanus* from a single population on Tioman Island was conducted between October 2003 and November 2006. Bat population counts and satellite telemetry were used to assess abundance and long-range movements of *P. vampyrus*. We also analyzed livestock production data from the index farm and modeled within-farm infection dynamics. Peninsular Malaysia and provided evidence for continued viral circulation in bats. Results from the pig farm analyses suggest that repeated introduction of NiV from the wildlife reservoir into this intensively managed pig population led to changes in infection dynamics in the pigs. Long-term within-farm persistence permitted regional spread of the virus, ultimately producing widespread human infection. Thus, while pteropid bats have likely been the reservoir for Nipah virus for a long time, the cause of emergence of NiV can be essentially characterized as due to agricultural intensification. Targeted surveillance of these farms in areas where flying fox distributions overlap commercial pig farms is therefore important to detect spillover events early-on and prevent widespread infection.

doi:10.1016/j.ijid.2008.05.007

7.004

Increased Risk of Death in HIV-Infected Patients with Pneumococcal Meningitis, South Africa, 2003—2005

P. Nyasulu[1,*], C. Cohen[2], A. von Gottberg[2], L. de Gouveia[3], V. Quan[2], C. Feldman[4], K.P. Klugman[5]

[1] *University of the Witwatersrand, Johannesburg, South Africa*
[2] *National Institute for Communicable Diseases (NICD) of the National Health Laboratory Service (NHLS) and University of the Witwatersrand, Johannesburg, South Africa*
[3] *National Institute for Communicable Diseases (NICD) of the National Health Laboratory Service (NHLS), Johannesburg, South Africa*
[4] *Division of Pulmonology, Department of Medicine, Johannesburg Hospital and University of the Witwatersrand, Johannesburg, South Africa*
[5] *Hubert Department of Global Health, Rollins School of Public Health, and Division of Infectious Diseases, School of Medicine, Emory University, Atlanta, GA, USA*

Background: Pneumococcal disease is an important cause of mortality in developing countries. We aimed to determine whether HIV-infection was associated with increased risk of death amongst invasive pneumococcal disease (IPD) cases.

Methods: Cases with IPD presenting to enhanced surveillance sites as part of national laboratory-based surveillance between January 2003 and December 2005 were reviewed. Surveillance officers collected epidemiologic data on cases and offered all cases HIV ELISA testing. Meningitis was defined as pneumococcal growth on cerebrospinal fluid specimen culture (with or without growth from another site) and other IPD as pneumococcal growth from other normally sterile site specimens. Risk factors for death in patients with meningitis and other IPD were evaluated using multivariable logistic regression.

Results: Of 11,116 reported IPD cases, 4890 (44%) presented to enhanced surveillance sites and had available outcome data; 1154 (24%) cases of meningitis and 3736 (76%) cases of other IPD. Of cases with available age, the age distribution was: <5 years, 1770/4882 (36%); 5—24 years, 774/4882 (16%); 25—44 years, 1693/4882 (35%); ≥45, 645/4882 (13%). The overall case fatality rate was

28% (1360/4890); 45% (520/1154) in meningitis and 22% (840/3736) in other IPD cases ($p < 0.001$). Of patients tested for HIV, HIV-seroprevalence was 512/664 (77%) amongst meningitis cases and 2062/2346 (88%) amongst other IPD ($p < 0.001$). On multivariable analysis of meningitis cases, HIV-coinfection was associated with increased odds of death when controlling for age group, severity of illness [Pitt bacteraemia score], prior antibiotic use and province (odds ratio 2.2, 95% confidence interval 1.3—3.6). HIV-coinfection was not an independent risk factor for death in other IPD cases.

Conclusions: Pneumococcal meningitis has a high mortality in South Africa, and HIV-infected patients are at increased risk of death. Access to antiretroviral therapy for HIV-positive patients and introduction of the pneumococcal conjugate vaccine for routine immunization should be prioritized.

doi:10.1016/j.ijid.2008.05.008

7.005

Intradermal Influenza Vaccine Elicits Superior Immunogenicity in Adults Aged ≥60 Years: A Randomized Controlled Phase 3 Trial

R. Arnou[1], M. De Decker[2], G. Icardi[3], A. Ambrozaitis[4], M. Kazek[5], M. Saville[5,*]

[1] *Private Practicioner, Angers, France*
[2] *SGS Life Science Services, Antwerp, Belgium*
[3] *Dipartimento Scienze della Salute, Genova, Italy*
[4] *Vilnius University, Vilnius, Lithuania*
[5] *Sanofi Pasteur, Lyon, France*

Background: Annual trivalent inactivated vaccines (TIV) provide protection against influenza and its complications for hundreds of millions of individuals. Yet among adults aged ≥60 years, vaccine efficacy is lower than in younger adults. Elderly adults are also the most at risk, with the highest influenza morbidity and mortality. An influenza vaccine, injected using a novel intradermal microinjection system, has been developed with the aim of offering improved protection for this vulnerable population.

Methods: A multicenter, randomized controlled phase 3 trial was conducted to assess whether TIV given via ID microinjection induces a superior immune response in adults ≥60 years, compared with an intramuscular (IM) control vaccine (Vaxigrip®). Each vaccine dose contained 15 μg hemagglutinin/strain. Strain-specific hemagglutination inhibition titers were assessed on D0 and 21 using a standard assay.

Results: 3701 subjects aged 60—94 years (mean: 70.8 ± 6.8) were enrolled and vaccinated ID ($n = 2612$) or IM ($n = 1089$). 54.4% were female. Seroprotection rates were significantly higher in the ID group ($p = 0.0003$ for H1N1 and B, $p < 0.0001$ for H3N2) with a difference of 5.5—6.6 percentage for each strain. Mean titer increases after ID vaccination were: H1N1 3.97, H3N2 8.19 and B 3.61, which were 24.5%, 53.1% and 18.8% higher ($p < 0.0001$) than the corresponding values in the IM group. Seroconversion rates among those with a prevaccination titer <10 were significantly higher with ID: H1N1 64.3% vs 55.6% $p = 0.0127$, H3N2 80.9% vs 69.3% $p = 0.0003$ and B 41.3% vs 35.5% $p = 0.0282$.

Conclusion: In a large phase 3 population of adults aged 60—94, the immunogenicity of a new ID influenza vaccine was superior to that of a conventional IM control vaccine. Increased serum antibody responses should provide improved protection against influenza for this vulnerable population.

doi:10.1016/j.ijid.2008.05.009

7.006

Comparison of Fluorescence Microscopy with Ziehl-Neelsen Technique in the Examination of Sputum for Acid-Fast Bacilli Using Bleach Centrifugation Method

S.W. Matu*, W.A. Githui, E.S. Juma

Kenya Medical Research Institute, Nairobi, Kenya

Background: The reliability of direct smear microscopy for diagnosis of tuberculosis (TB) using Ziehl-Neelsen (ZN) technique has frequently been questioned due to low sensitivity. Fluorescent microscopy (FM) is more sensitive than ZN but its sensitivity is less than culture. Treatment of sputum with bleach has been used to increase sensitivity in many settings. However, no study has compared use FM and ZN methods for detection of acid-fast bacilli (AFB) using bleach method.

Objectives: Comparison of results with fluorescence and bright-field microscopy for AFB using bleach centrifugation method.

Methods: Three hundred and seventy sputum specimens were collected from new TB suspects attending Mbagathi District Hospital and processed for direct microscopy using both ZN and FM. Culture on Loweinstein Jensen egg media was used as the gold standard. FM and ZN smear negative specimens were treated with 3.5% bleach and left to stand for 30 minutes before centrifugation. Smears were prepared from each bleach treated specimen, processed and examined using either ZN or FM staining methods.

Results: Of the 370 specimens, 200(54%) were culture positive. The number of smear positive by direct ZN was 138 (37.2%) which increased to 171 (46.2%) and direct FM positive was 165 (44.6%) which increased to 180 (48.6%), after treatment of direct ZN and FM smear negative specimens with 3.5% bleach, respectively. There was a significant increase in sensitivity from 66% to 81.1% ($p < 0.05$) using ZN technique and 75.5% to 83% ($p < 0.05$).

Conclusion: Bleach centrifugation method significantly increases the sensitivity of smear negative specimens irrespective of the staining method used. However, FM appears to be more sensitive than ZN.

doi:10.1016/j.ijid.2008.05.010